REMARKS

In view of the following remarks, the Examiner is respectfully requested to withdraw the rejections and allow Claims 1-17, 19 and 48, the only claims pending and under examination in this application.

Formal Matters

The Applicants thank the Examiner for the indication that Claim 48 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all the limitations of the base claim and any intervening claims.

Rejections under 35 U.S.C. §103(a)

Claims 1-8, 10, 11, 17, 19 and 48 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Fox (WO 01/14591) in view of Dames (U.S. Patent No. 6,323,770).

The Applicants submit that a *prima facie* case of obviousness has not been established for at least the following reasons:

- the cited references fail to teach or suggest every element of the Applicant's claimed invention;
- there is no apparent reason that would have prompted a person of ordinary skill in the art to combine the references in the manner suggested by the Examiner because Dames teaches away from the Applicants' claimed invention;
- there is no apparent reason to combine the references in the manner suggested by the Examiner because Dames is non-analogous prior art; and
- the Applicants' claimed invention is more than the predictable use of prior art elements according to their established functions.

In maintaining the current rejection, the Examiner argues that Fox substantially discloses the Applicants' claimed invention. However, the Examiner concedes that "Fox fails to teach that said detecting comprises applying a DC bias field and an AC tickling filed." Office Action, pg. 4, lines 7-8. To remedy this deficiency, the Examiner relies upon the asserted teachings of Dames. Specifically, the Examiner alleges that "Dames teaches using a DC current and AC current to detect a magnetic tag." Office Action, pg. 4, line 9.

The Applicants respectfully disagree and contend that a *prima facie* case of obviousness has not been established because the cited references fail to disclose or suggest every element of the Applicants' claimed invention.

The Applicants' claimed invention includes the element that the "detecting comprises applying a DC bias field and an AC tickling field." In addition, the instant Specification discloses as follows:

> The operation of a spin valve detector (FIGS. 2A and 2B) is described as follows: 1) The magnetic nanoparticle under a DC bias field (H_b) generates a magnetic field around it. 2) The magnetic field will affect the resistance of a spin valve closely underneath it. 3) Application of an AC tickling field (H_t) will force the moment of [the] particle to oscillate, resulting in an oscillating MR signal from [the] spin valve.

Specification, pg. 14, ¶ [0054].

Thus, the Applicants' claimed element of "applying a DC bias field and an AC tickling field" causes the magnetic moment of the magnetic particles to oscillate, resulting in a detectable oscillation in the magnetoresistance (MR) ratio.

In contrast, Dames actually discloses methods of interrogating a magnetic tag or marker within a predetermined interrogation zone to detect its presence and/or to determine its position within the interrogation zone. Dames, Abstract; and col. 4, lines

5-15. Dames discloses that the interrogation process includes the step of subjecting the tag to a magnetic field sufficient in field strength to saturate the high permeability magnetic material. Dames, Abstract; and col. 4, lines 5-15. In addition, Dames discloses that "When a tag containing a piece of high-permeability magnetic material is passed along the coils' axis through the region over which oscillation of the magnetic zero plane occurs, it will initially be completely saturated by the DC magnetic field." Dames, col. 7, lines 10-14. Thus, Dames discloses that the applied DC magnetic field completely saturates the magnetic tags.

Magnetic saturation occurs when an increase in an applied external magnetizing field cannot further increase the induced magnetization of a magnetic material, so the total induced magnetic field of the magnetic material reaches a maximum.[1] In addition, when a magnetic material is saturated, all of the magnetic domains within the magnetic material have magnetic moments that are aligned and parallel with the applied external field.[2]

As described above, in the method disclosed by Dames, the applied magnetic field completely saturates the magnetic tags. Thus, the total induced magnetic field of the magnetic tags is at a maximum, such that any increase in the applied external field will not further increase the induced magnetic field of the magnetic tags. In addition, because Dames discloses that the magnetic tags are completely saturated, all of the magnetic domains within the magnetic tags have magnetic moments that are aligned and parallel with the applied external field. As such, increasing the strength of the applied DC field or applying an additional AC field to the saturated magnetic tags will have no effect on the induced magnetic field of the saturated magnetic tags because the induced magnetic field is already at a maximum. Moreover, applying an additional AC field to the saturated magnetic tags will not cause the magnetic moments of the

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[1] See e.g., "Saturation (magnetic)." Wikipedia (available online at http://en.wikipedia.org/wiki/Saturation_%28magnetic%29), accessed April 7, 2010; Hansen, Barry, "Magnetic Materials: Saturation." (available online at http://www.coilgun.info/theorymath/saturation.htm), accessed April 7, 2010.
[2] *Id.*

saturated magnetic tags to oscillate because all of the magnetic domains within the saturated magnetic tags have magnetic moments that are aligned and parallel with the applied external field. Thus, because Dames discloses that the applied DC magnetic field completely saturates the magnetic tags, Dames does not disclose or suggest the element of applying an AC tickling field, as required by the Applicants' claimed invention.

As such, the Applicants submit that a *prima facie* case of obviousness has not been established because the cited references do not teach or suggest every element of the Applicants' claimed invention. Therefore, the Applicants respectfully request withdrawal of this rejection.

Furthermore, the Applicants contend that a *prima facie* case of obviousness has not been established because there is no apparent reason that would have prompted a person of ordinary skill in the art to combine the references in the manner suggested by the Examiner because Dames teaches away from the Applicants' claimed invention.

It is well established that a reference cannot render an invention obvious if the prior art teaches away from that invention. See, e.g., *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1740 (2007):

> [Once] all claim limitations are found in a number of prior art references, the factfinder must determine [w]hat the prior art teaches [and] whether it teaches away from the claimed invention.[3]
>
> A *prima facie* case of obviousness may also be rebutted by showing that the art, in any material respect, teaches away from the claimed invention.[4]

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[3] See also *Pharmastem Therapeutics v. Viacell et al.*, 2007 U.S. App. LEXIS 16245 (Fed. Cir. 2007);*Omegaflex, Inc. v. Parker-Hannifin Corp.*, 2007 U.S. App. LEXIS 14308 (Fed. Cir. 2007); *Dystar Textilfarben GmbH v. C.H. Patrick Co.*, 464 F.3d 1356, 1360 (Fed. Cir. 2006); *In re Kahn*, 441 F.3d 977, 985 (Fed. Cir. 2006); *Medichem*, 437 F.3d at 1164; *In re Fulton*, 391 F.3d 1195, 1199-1200 (Fed. Cir. 2004).

[4] *In re Geisler*, 116 F.3d 1465, 1471, 43 USPQ2d 1362, 1366 (Fed. Cir. 1997).

As described above, the Applicants' claimed invention includes the element that the "detecting comprises applying a DC bias field and an AC tickling field."

In contrast, as discussed above, in the method disclosed by Dames, the applied magnetic field completely saturates the magnetic tags. As such, increasing the strength of the applied DC field or applying an AC tickling field to the saturated magnetic tags will have no effect on the induced magnetic field of the saturated magnetic tags because the induced magnetic field is already at a maximum. Moreover, applying an AC tickling field to the saturated magnetic tags will not cause the magnetic moments of the saturated magnetic tags to oscillate because all of the magnetic domains within the saturated magnetic tags have magnetic moments that are aligned and parallel with the applied external field. Thus, because Dames discloses that the applied DC magnetic field completely saturates the magnetic tags, Dames actually teaches away from the Applicants' claimed invention, which requires the element of detecting the complex by applying a DC bias field and an AC tickling field.

Accordingly, a person of ordinary skill in the art desiring to detect complexes labeled with magnetizable nanoparticles by applying a DC bias field and an AC tickling field, as claimed by the Applicants, would have no apparent reason to combine the references in the manner suggested by the Examiner. As discussed above, Dames teaches away from the Applicants' claimed invention because Dames discloses that the applied DC magnetic field completely saturates the magnetic tags. A person of ordinary skill in the art would not expect the application of an AC tickling field to the saturated magnetic tags of Dames to have any detectable effect. Consequently, a person of ordinary skill in the art would have no apparent reason to combine the method disclosed by Dames with the disclosure of Fox, as suggested by the Examiner, to arrive at the Applicants' claimed invention.

As such, the Applicants submit that a *prima facie* case of obviousness has not been established because a person of ordinary skill in the art would have no apparent

reason to combine the references in the manner suggested by the Examiner. Therefore, the Applicants respectfully request withdrawal of this rejection.

Furthermore, the Applicants submit that a person of ordinary skill in the art, absent the teachings of the present specification, would additionally have no apparent reason to combine the cited references in the manner suggested by the Examiner because Dames is non-analogous prior art.

With regard to the appropriateness of combining references, MPEP § 2141.01(a) states:

> "In order to rely on a reference as a basis for rejection of an applicant's invention, the reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned." *In re Oetiker*, 977 F.2d 1443, 1446 (Fed. Cir. 1992).

The Applicants submit that Fox as been improperly combined with Dames because Dames is not in the field of the Applicants' endeavor and is not reasonably pertinent to the particular problem that is the concern of the claimed invention. The rejected claims are drawn to a method of detecting a complex labeled with magnetizable nanoparticles. Specification, pg. 2, ¶¶ [0003]-[0004].

In contrast, Dames is directed to a method of interrogating macroscale magnetic tags for "inventory control, ticketing, automated shopping systems, monitoring work-in-progress, security tagging, access control, anti-counterfeiting". Dames, col. 1, lines 45-49. As such, Dames is completely unrelated to the field of Applicants' endeavor.

Specifically, Dames discloses a method of interrogating a macroscale magnetically coded tag by applying a magnetic field to the tag and measuring the difference between the response of the tag in a zero field (i.e., magnetic null) and in a saturating magnetic field. Dames, col. 2, lines 53-62. However, contrary to the

assertions of the Examiner, a person of ordinary skill in the art would have no apparent reason to combine the teachings of Dames with those of Fox because, in contrast to the claimed invention, Dames teaches using an applied magnetic field for interrogating macroscale magnetic tags, not magnetic nanoparticles as claimed. For instance, in describing the dimensions of magnetic tags, Dames discloses that "the minimum length of individual elements which can be used is probably on the order of a few millimeters" and that "the magnetic material is preferably in the form of a long thin strip or of a thin film." Dames, col. 8, lines 25-27; and col. 3, lines 55-57.

It is well established that magnetic nanoparticles possess unique magnetic properties which make them distinct from macroscale magnetic materials. The scientific literature includes numerous examples demonstrating this distinction. For example, Lu, et al. (*Angew. Chem. Int. Ed.* 2007; 46: 1222-1244) and Lin, et al. (*J. Magnet. Magnet. Mat.* 2006; 305: 100-109) disclose that magnetic nanoparticles are distinct from macroscale magnetic materials because magnetic nanoparticles possess novel properties not found in macroscale magnetic materials. For instance, magnetic nanoparticles exhibit enhanced remanence, quantization of spin waves, giant coercivity, exponentially slow relaxation at low temperature due to anisotropy barriers, as well as superparamagnetism.

In contrast, macroscale magnetic materials include a large number of magnetic domains that form so as to minimize the magnetostatic energy of the material. For this reason, magnetic domains of macroscale magnetic materials play a significant role in determining its magnetic properties. However, as particle size approaches the nanoscale, the particle size and the exchange length converge allowing for single domain states. The magnetism and hence the magnetic properties of nanoparticles can therefore be dictated by properties such as anisotropy and external thermal energy (i.e., temperature). As such, magnetic nanoparticles are well known in the art to be distinct from macroscale magnetic materials.

Accordingly, the Applicants submit that a person of ordinary skill in the art would have no apparent reason to combine the teachings of Dames, which employs macroscale magnetic materials, with Fox to render obvious the instant claims, which are specifically directed to magnetic nanoparticles. Therefore, in making this rejection of the claims over Fox in view of Dames, the Examiner has improperly combined the Dames reference because the Dames reference is non-analogous prior art. As such, a *prima facie* case of obviousness has not been established and the Applicants respectfully request withdrawal of this rejection.

Furthermore, even assuming for the sake of argument that the cited references may be combined as suggested by the Examiner, the Applicants additionally contend that a *prima facie* case of obviousness has not been established because the Applicants' claimed invention is more than the predictable use of prior art elements according to their established functions.

As described above, Dames discloses that the applied DC magnetic field completely saturates the magnetic tags. As such, increasing the strength of the applied DC field or applying an AC tickling field to the saturated magnetic tags will have no effect on the induced magnetic field of the saturated magnetic tags because the induced magnetic field is already at a maximum. Moreover, applying an AC tickling field to the saturated magnetic tags will not cause the magnetic moments of the saturated magnetic tags to oscillate because all of the magnetic domains within the saturated magnetic tags have magnetic moments that are aligned and parallel with the applied external field. As such, a person of ordinary skill in the art would not expect the application of an AC tickling field to the saturated magnetic tags of Dames to have any detectable effect because Dames teaches that the magnetic tags are completely saturated. Consequently, a person of ordinary skill in the art, absent the teachings of the present specification, would not have expected the combined teachings of Fox and Dames to result in a predicted success.

Accordingly, in view of the arguments above, the Applicants contend that the

Examiner has not established that the claimed invention as a whole would have been obvious to a person of ordinary skill in the art at the time of the invention. As such, the Applicants submit that a *prima facie* case of obviousness has not been established, and thus respectfully request withdrawal of this rejection.

Claims 1-8, 10, 11, 14-17 and 19 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Coehoorn et al. (WO 03/054523) in view of Dames (U.S. Patent No. 6,323,770).

In making this rejection, the Examiner asserts that "Coehoorn teaches a method of magnetic detection comprising providing biological molecules on a substrate of a magnetoresistive device; adding magnetic nanoparticles conjugated with binding molecules specific for biological molecules on the substrate of the magnetoresistive device so that the biological molecules on the substrate and the nanoparticles form a complex; detecting such complex." Office Action, pg. 5, lines 1-5. The Examiner concedes that "Coehoorn fails to teach said detecting comprises applying a DC bias field and an AC tickling field." Office Action. Pg. 5, lines 15-16. To remedy this deficiency, the Examiner cites Dames for its alleged teaching of "using a DC current and AC current to detect a magnetic tag" asserting that "it would have been obvious to one of ordinary skill in the art to apply the concept of using DC current and AC current (low frequency AC tickling field) to detect magnetic response of a magnetic tag as taught by Dames to the method of Coehoorn to detect predetermined region of a magnetic marker or particles in assay." Office Action, pg. 5-6, bridging sentence.

The Applicants respectfully disagree and contend that a *prima facie* case of obviousness has not been established because the cited references fail to disclose or suggest every element of the Applicants' claimed invention.

As discussed above, in the method disclosed by Dames, the applied magnetic field completely saturates the magnetic tags. As such, increasing the strength of the applied DC field or applying an additional AC field to the saturated magnetic tags will

have no effect on the induced magnetic field of the saturated magnetic tags because the induced magnetic field is already at a maximum. Moreover, applying an additional AC field to the saturated magnetic tags will not cause the magnetic moments of the saturated magnetic tags to oscillate because all of the magnetic domains within the saturated magnetic tags have magnetic moments that are aligned and parallel with the applied external field. Thus, because Dames discloses that the applied DC magnetic field completely saturates the magnetic tags, Dames does not disclose or suggest the element of applying an AC tickling field, as required by the Applicants' claimed invention.

As such, the Applicants submit that a *prima facie* case of obviousness has not been established because the cited references do not teach or suggest every element of the Applicants' claimed invention. Therefore, the Applicants respectfully request withdrawal of this rejection.

Furthermore, the Applicants submit that a person of ordinary skill in the art absent the teaching of the present specification, would have no apparent reason to combine the cited references in the manner suggested by the Examiner because Dames teaches away from the Applicants' claimed invention.

As discussed above, a person of ordinary skill in the art would have been taught away from the Applicants' claimed invention because Dames discloses that the applied DC magnetic field completely saturates the magnetic tags. As described above, increasing the strength of the applied DC field or applying an AC tickling field to the saturated magnetic tags will have no effect on the induced magnetic field of the saturated magnetic tags because the induced magnetic field is already at a maximum. Moreover, applying an AC tickling field to the saturated magnetic tags will not cause the magnetic moments of the saturated magnetic tags to oscillate because all of the magnetic domains within the saturated magnetic tags have magnetic moments that are aligned and parallel with the applied external field. Thus, because Dames discloses that the applied DC magnetic field completely saturates the magnetic tags, Dames

actually teaches away from the Applicants' claimed invention, which requires the element of detecting the complex by applying a DC bias field and an AC tickling field.

Accordingly, a person of ordinary skill in the art desiring to detect complexes labeled with magnetizable nanoparticles by applying a DC bias field and an AC tickling field, as claimed by the Applicants, would have no apparent reason to combine the references in the manner suggested by the Examiner.

Furthermore, the Applicants submit that a person of ordinary skill in the art, absent the teachings of the present specification, would additionally have no apparent reason to combine the cited references in the manner suggested by the Examiner because Dames is non-analogous prior art.

As discussed above, Dames teaches using a DC current and AC current for interrogating macroscale magnetic tags, not magnetic nanoparticles as claimed. For instance, in describing the dimensions of magnetic tags, Dames discloses that "the minimum length of individual elements which can be used is probably on the order of a few millimeters" and that "the magnetic material is preferably in the form of a long thin strip or of a thin film." Dames, col. 8, lines 25-27; and col. 3, lines 55-57. As noted above, it is well established that magnetic nanoparticles possess unique magnetic properties which make them distinct from macroscale magnetic materials where the scientific literature includes numerous examples demonstrating this distinction.

Accordingly, the Applicants submit that a person of ordinary skill in the art would have no apparent reason to combine the teachings of Dames, which employs macroscale magnetic materials, with Coehoorn to render obvious the instant claims, which are specifically directed to magnetic nanoparticles. Therefore, in making this rejection of the claims over Coehoorn in view of Dames, the Examiner has improperly combined the Dames reference because the Dames reference is non-analogous prior art. As such, a *prima facie* case of obviousness has not been established and the Applicants respectfully request withdrawal of this rejection.

Furthermore, even assuming for the sake of argument that the cited references may be combined as suggested by the Examiner, the Applicants additionally contend that a *prima facie* case of obviousness has not been established because the Applicants' claimed invention is more than the predictable use of prior art elements according to their established functions.

As described above, Dames discloses that the applied DC magnetic field completely saturates the magnetic tags. As such, increasing the strength of the applied DC field or applying an AC tickling field to the saturated magnetic tags will have no effect on the induced magnetic field of the saturated magnetic tags because the induced magnetic field is already at a maximum. Moreover, applying an AC tickling field to the saturated magnetic tags will not cause the magnetic moments of the saturated magnetic tags to oscillate because all of the magnetic domains within the saturated magnetic tags have magnetic moments that are aligned and parallel with the applied external field. As such, a person of ordinary skill in the art would not expect the application of an AC tickling field to the saturated magnetic tags of Dames to have any detectable effect because Dames teaches that the magnetic tags are completely saturated. Consequently, a person of ordinary skill in the art, absent the teachings of the present specification, would not have expected the combined teachings of Fox and Dames to result in a predicted success.

Accordingly, in view of the arguments above, Applicants contend that the Examiner has not established that the claimed invention as a whole would have been obvious to a person of ordinary skill in the art at the time of the invention. As such, the Applicants submit that a *prima facie* case of obviousness has not been established, and thus respectfully request withdrawal of this rejection.

Claims 1, 2-8, 10, 11, 17 and 19 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Baselt (U.S. Patent No. 5,981,297) in view of Dames (U.S. Patent No. 6,323,770).

In making this rejection, the Examiner asserts that Baselt teaches a method for detecting target molecules such that "the method comprises providing recognition molecules bound to a surface of a magnetic field sensor; adding target molecules bound to magnetic particles; exposing the magnetic particles bound target molecules to the surface of the magnetic field sensor bound recognition molecules so that the molecules form a complex; detecting such complex." Office Action, pg. 6, lines 8-12. The Examiner concedes that "Baselt fails to teach said detecting comprises applying a DC bias field and an AC tickling field." Office Action, pg. 6, lines 20-21. To remedy this deficiency, the Examiner cites Dames for its alleged teaching of "using a DC current and AC current to detect a magnetic tag" asserting that "it would have been obvious to one of ordinary skill in the art to apply the concept of using DC current and AC current (low frequency AC tickling field) to detect magnetic response of a magnetic tag as taught by Dames to the method of Baselt to detect predetermined region of a magnetic marker or particles in assay." Office Action, pg. 7, lines 1-8.

The Applicants respectfully disagree and contend that a *prima facie* case of obviousness has not been established because the cited references fail to disclose or suggest every element of the Applicants' claimed invention.

As discussed above, in the method disclosed by Dames, the applied magnetic field completely saturates the magnetic tags. As such, increasing the strength of the applied DC field or applying an additional AC field to the saturated magnetic tags will have no effect on the induced magnetic field of the saturated magnetic tags because the induced magnetic field is already at a maximum. Moreover, applying an additional AC field to the saturated magnetic tags will not cause the magnetic moments of the saturated magnetic tags to oscillate because all of the magnetic domains within the saturated magnetic tags have magnetic moments that are aligned and parallel with the applied external field. Thus, because Dames discloses that the applied DC magnetic field completely saturates the magnetic tags, Dames does not disclose or suggest the element of applying an AC tickling field, as required by the Applicants' claimed

invention.

As such, the Applicants submit that a *prima facie* case of obviousness has not been established because the cited references do not teach or suggest every element of the Applicants' claimed invention. Therefore, the Applicants respectfully request withdrawal of this rejection.

Furthermore, the Applicants submit that a person of ordinary skill in the art absent the teaching of the present specification, would have no apparent reason to combine the cited references in the manner suggested by the Examiner because Dames teaches away from the Applicants' claimed invention.

As discussed above, a person of ordinary skill in the art would have been taught away from the Applicants' claimed invention because Dames discloses that the applied DC magnetic field completely saturates the magnetic tags. As described above, increasing the strength of the applied DC field or applying an AC tickling field to the saturated magnetic tags will have no effect on the induced magnetic field of the saturated magnetic tags because the induced magnetic field is already at a maximum. Moreover, applying an AC tickling field to the saturated magnetic tags will not cause the magnetic moments of the saturated magnetic tags to oscillate because all of the magnetic domains within the saturated magnetic tags have magnetic moments that are aligned and parallel with the applied external field. Thus, because Dames discloses that the applied DC magnetic field completely saturates the magnetic tags, Dames actually teaches away from the Applicants' claimed invention, which requires the element of detecting the complex by applying a DC bias field and an AC tickling field.

Accordingly, a person of ordinary skill in the art desiring to detect complexes labeled with magnetizable nanoparticles by applying a DC bias field and an AC tickling field, as claimed by the Applicants, would have no apparent reason to combine the references in the manner suggested by the Examiner.

Furthermore, the Applicants submit that a person of ordinary skill in the art, absent the teachings of the present specification, would additionally have no apparent reason to combine the cited references in the manner suggested by the Examiner because Dames is non-analogous prior art.

As discussed above, Dames teaches using a DC current and AC current for interrogating macroscale magnetic tags, not magnetic nanoparticles as claimed. For instance, in describing the dimensions of magnetic tags, Dames discloses that "the minimum length of individual elements which can be used is probably on the order of a few millimeters" and that "the magnetic material is preferably in the form of a long thin strip or of a thin film." Dames, col. 8, lines 25-27; and col. 3, lines 55-57. As noted above, it is well established that magnetic nanoparticles possess unique magnetic properties which make them distinct from macroscale magnetic materials where the scientific literature includes numerous examples demonstrating this distinction.

Accordingly, the Applicants submit that a person of ordinary skill in the art would have no apparent reason to combine the teachings of Dames, which employs macroscale magnetic materials, with Baselt to render obvious the instant claims, which are specifically directed to magnetic nanoparticles. Therefore, in making this rejection of the claims over Baselt in view of Dames, the Examiner has improperly combined the Dames reference because the Dames reference is non-analogous prior art. As such, a *prima facie* case of obviousness has not been established and the Applicants respectfully request withdrawal of this rejection.

Furthermore, even assuming for the sake of argument that the cited references may be combined as suggested by the Examiner, the Applicants additionally contend that a *prima facie* case of obviousness has not been established because the Applicants' claimed invention is more than the predictable use of prior art elements according to their established functions.

As described above, Dames discloses that the applied DC magnetic field

completely saturates the magnetic tags. As such, increasing the strength of the applied DC field or applying an AC tickling field to the saturated magnetic tags will have no effect on the induced magnetic field of the saturated magnetic tags because the induced magnetic field is already at a maximum. Moreover, applying an AC tickling field to the saturated magnetic tags will not cause the magnetic moments of the saturated magnetic tags to oscillate because all of the magnetic domains within the saturated magnetic tags have magnetic moments that are aligned and parallel with the applied external field. As such, a person of ordinary skill in the art would not expect the application of an AC tickling field to the saturated magnetic tags of Dames to have any detectable effect because Dames teaches that the magnetic tags are completely saturated. Consequently, a person of ordinary skill in the art, absent the teachings of the present specification, would not have expected the combined teachings of Fox and Dames to result in a predicted success.

Accordingly, in view of the arguments above, Applicants contend that the Examiner has not established that the claimed invention as a whole would have been obvious to a person of ordinary skill in the art at the time of the invention. As such, the Applicants submit that a *prima facie* case of obviousness has not been established, and thus respectfully request withdrawal of this rejection.

Claims 1-8, 10, 11, 14 and 15 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Terstappen et al (U.S. Patent No. 6,623,983) in view of Dames (U.S. Patent No. 6,323,770).

In making this rejection, the Examiner asserts that Terstappen teaches a method which "comprises providing one member of a specific binding pair bound to the collection surface and the other member bound to magnetic nanoparticles; exposing the magnetic nanoparticles bound binding member to the collection surface to form a complex between the binding members; detecting said complex." Office Action, pg. 7, lines 13-18. The Examiner concedes that "Terstappen fails to teach said detecting comprises applying a DC bias field and an AC tickling field." Office Action, pg. 8, lines

3-4. To remedy this deficiency, the Examiner cites Dames for its alleged teaching of "using a DC current and AC current to detect a magnetic tag" asserting that "it would have been obvious to one of ordinary skill in the art to apply the concept of using DC current and AC current (low frequency AC tickling field) to detect magnetic response of a magnetic tags as taught by Dames to the method of Terstappen to detect predetermined region of a magnetic marker or particles in assay." Office Action, pg. 8, lines 5-12.

The Applicants respectfully disagree and contend that a *prima facie* case of obviousness has not been established because the cited references fail to disclose or suggest every element of the Applicants' claimed invention.

As discussed above, in the method disclosed by Dames, the applied magnetic field completely saturates the magnetic tags. As such, increasing the strength of the applied DC field or applying an additional AC field to the saturated magnetic tags will have no effect on the induced magnetic field of the saturated magnetic tags because the induced magnetic field is already at a maximum. Moreover, applying an additional AC field to the saturated magnetic tags will not cause the magnetic moments of the saturated magnetic tags to oscillate because all of the magnetic domains within the saturated magnetic tags have magnetic moments that are aligned and parallel with the applied external field. Thus, because Dames discloses that the applied DC magnetic field completely saturates the magnetic tags, Dames does not disclose or suggest the element of applying an AC tickling field, as required by the Applicants' claimed invention.

As such, the Applicants submit that a *prima facie* case of obviousness has not been established because the cited references do not teach or suggest every element of the Applicants' claimed invention. Therefore, the Applicants respectfully request withdrawal of this rejection.

Furthermore, the Applicants submit that a person of ordinary skill in the art

absent the teaching of the present specification, would have no apparent reason to combine the cited references in the manner suggested by the Examiner because Dames teaches away from the Applicants' claimed invention.

As discussed above, a person of ordinary skill in the art would have been taught away from the Applicants' claimed invention because Dames discloses that the applied DC magnetic field completely saturates the magnetic tags. As described above, increasing the strength of the applied DC field or applying an AC tickling field to the saturated magnetic tags will have no effect on the induced magnetic field of the saturated magnetic tags because the induced magnetic field is already at a maximum. Moreover, applying an AC tickling field to the saturated magnetic tags will not cause the magnetic moments of the saturated magnetic tags to oscillate because all of the magnetic domains within the saturated magnetic tags have magnetic moments that are aligned and parallel with the applied external field. Thus, because Dames discloses that the applied DC magnetic field completely saturates the magnetic tags, Dames actually teaches away from the Applicants' claimed invention, which requires the element of detecting the complex by applying a DC bias field and an AC tickling field.

Accordingly, a person of ordinary skill in the art desiring to detect complexes labeled with magnetizable nanoparticles by applying a DC bias field and an AC tickling field, as claimed by the Applicants, would have no apparent reason to combine the references in the manner suggested by the Examiner.

Furthermore, the Applicants submit that a person of ordinary skill in the art, absent the teachings of the present specification, would additionally have no apparent reason to combine the cited references in the manner suggested by the Examiner because Dames is non-analogous prior art.

As discussed above, Dames teaches using a DC current and AC current for interrogating macroscale magnetic tags, not magnetic nanoparticles as claimed. For instance, in describing the dimensions of magnetic tags, Dames discloses that "the

minimum length of individual elements which can be used is probably on the order of a few millimeters" and that "the magnetic material is preferably in the form of a long thin strip or of a thin film." Dames, col. 8, lines 25-27; and col. 3, lines 55-57. As noted above, it is well established that magnetic nanoparticles possess unique magnetic properties which make them distinct from macroscale magnetic materials where the scientific literature includes numerous examples demonstrating this distinction.

Accordingly, the Applicants submit that a person of ordinary skill in the art would have no apparent reason to combine the teachings of Dames, which employs macroscale magnetic materials, with Terstappen to render obvious the instant claims, which are specifically directed to magnetic nanoparticles. Therefore, in making this rejection of the claims over Terstappen in view of Dames, the Examiner has improperly combined the Dames reference because the Dames reference is non-analogous prior art. As such, a *prima facie* case of obviousness has not been established and the Applicants respectfully request withdrawal of this rejection.

Furthermore, even assuming for the sake of argument that the cited references may be combined as suggested by the Examiner, the Applicants additionally contend that a *prima facie* case of obviousness has not been established because the Applicants' claimed invention is more than the predictable use of prior art elements according to their established functions.

As described above, Dames discloses that the applied DC magnetic field completely saturates the magnetic tags. As such, increasing the strength of the applied DC field or applying an AC tickling field to the saturated magnetic tags will have no effect on the induced magnetic field of the saturated magnetic tags because the induced magnetic field is already at a maximum. Moreover, applying an AC tickling field to the saturated magnetic tags will not cause the magnetic moments of the saturated magnetic tags to oscillate because all of the magnetic domains within the saturated magnetic tags have magnetic moments that are aligned and parallel with the applied external field. As such, a person of ordinary skill in the art would not expect the

application of an AC tickling field to the saturated magnetic tags of Dames to have any detectable effect because Dames teaches that the magnetic tags are completely saturated. Consequently, a person of ordinary skill in the art, absent the teachings of the present specification, would not have expected the combined teachings of Fox and Dames to result in a predicted success.

Accordingly, in view of the arguments above, Applicants contend that the Examiner has not established that the claimed invention as a whole would have been obvious to a person of ordinary skill in the art at the time of the invention. As such, the Applicants submit that a *prima facie* case of obviousness has not been established, and thus respectfully request withdrawal of this rejection.

Claims 9, 12, and 13 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Fox, or Baselt or Coehoorn in view of Dames, and further in view of Berning et al. (U.S. Application Publication No. 2005/0025969).

Claims 9, 12 and 13 depend from Claim 1. As discussed above, Fox, or Baselt or Coehoorn in view of Dames fails to render the instantly claimed invention obvious for at least the following reasons:

- the cited references fail to teach or suggest every element of the Applicant's claimed invention;
- there is no apparent reason that would have prompted a person of ordinary skill in the art to combine the references in the manner suggested by the Examiner because Dames teaches away from the Applicants' claimed invention;
- there is no apparent reason to combine the references in the manner suggested by the Examiner because Dames is non-analogous prior art; and
- the Applicants' claimed invention is more than the predictable use of prior art elements according to their established functions.

Since Berning was merely cited for its alleged disclosure of "nanoparticles coated with a layer of gold including a magnetic nanoparticle central core, and a coating of gold completely encapsulating the magnetic nanoparticle central core", Berning fails to make up for these deficiencies in Fox, Baselt or Coehoorn and Dames, as discussed above.

Accordingly, the Applicants submit that a *prima facie* case of obviousness has not been established and respectfully request withdrawal of this rejection.

Claim 16 was rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Fox, or Baselt in view of Ferreira, et al. (*Journal of Applied Physics* Vol. 93, No. 10, 15 (May 2003), pp. 7281-7286).

In order to meet its burden in establishing a rejection under 35 U.S.C. §103, the Office must first demonstrate that a prior art reference, or references when combined, teach or suggest all claim elements. *See, e.g., In re Royka*, 490 F.2d 981, 985 (CCPA 1974); *KSR Int'l Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1740 (2007); *Pharmastem Therapeutics v. Viacell*, 491 F.3d 1342, 1360 (Fed. Cir. 2007); MPEP § 2143(A)(1). Moreover, "[a]ll words in a claim must be considered in judging the patentability of that claim against the prior art." *See In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970).

In making this rejection, the Examiner asserts that Fox or Baselt teach all the elements of the claimed invention. However, the Examiner concedes that Fox and Baselt "fail to teach the substrate comprises a high sensitivity spin valve or a magnetic tunnel junction detector array." Office Action, pg. 10, lines 1-3. To remedy this deficiency, the Examiner cites Ferreira for its alleged teaching of "using arrays spin valve sensors to detect magnetically labeled biomolecules." Office Action, pg. 10, lines 4-5.

The Applicants note that Claim 16 depends from Claim 1, and thus includes the

element of "wherein said detecting comprises applying a DC bias field and an AC tickling field". The Applicants submit that neither Fox nor Baselt teach or suggest this element as claimed. Both Fox and Baselt are completely silent as to applying a DC bias field an AC tickling field. Indeed, the Examiner concedes that "Fox fails to teach that said detecting comprises applying a DC bias field and an AC tickling field", and that "Baselt fails to teach said detecting comprises applying a DC bias field and an AC tickling field." Office Action, pg. 4, lines 7-8 and pg. 6, lines 20-21.

As Ferreira was merely cited for its asserted teaching of "using arrays spin valve sensors to detect magnetically labeled biomolecules", Ferreria fails to remedy the deficiencies in the teachings of Fox or Baselt, as discussed above.

As such, Claim 16 is not obvious under 35 U.S.C. §103(a) over Fox or Baselt in view of Ferreira. Therefore, the Applicants respectfully request withdrawal of this rejection.

CONCLUSION

Applicants submit that all of the claims are now in condition for allowance, which action is requested. If the Examiner finds that a Telephone Conference would expedite the prosecution of this application, he is invited to telephone the undersigned at the number provided.

The Commissioner is hereby authorized to charge any other fees under 37 C.F.R. §§ 1.16 and 1.17 which may be required by this paper, or to credit any overpayment, to Deposit Account No. 50-0815, order number STAN-571.

Respectfully submitted,
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